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(71) Applicant
Mitsubishi Denki Kabushiki Kaisha (Japan),
No. 2-3 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan

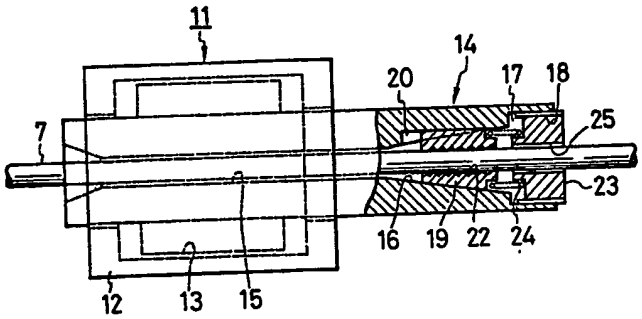
(72) Inventor
Hisao Sugiyama

(74) Agent and/or Address for Service
Marks and Clerk, Alpha Tower, Suffolk Street, Queensway,
Birmingham B1 1TT

(54) Welding wire feeder with rotationally driven chuck

(57) A centrally bored motor shaft 14 has a conical recess 16 followed by a cylindrical recess 17 at one end to receive a segmented chuck 19 and a biasing nut/spring 23, 24. Inner threads 22 on the chuck segments bite into the outer circumference of a welding wire 7 extending axially through the shaft and nut when the latter is tightened. The chuck segments are slidably keyed to the shaft for rotation therewith, and wire is thus positively advanced or "screwed" through the feeder when the motor is energized. The chuck may alternatively be driven via intermediate gears.

FIG. 1



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The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1

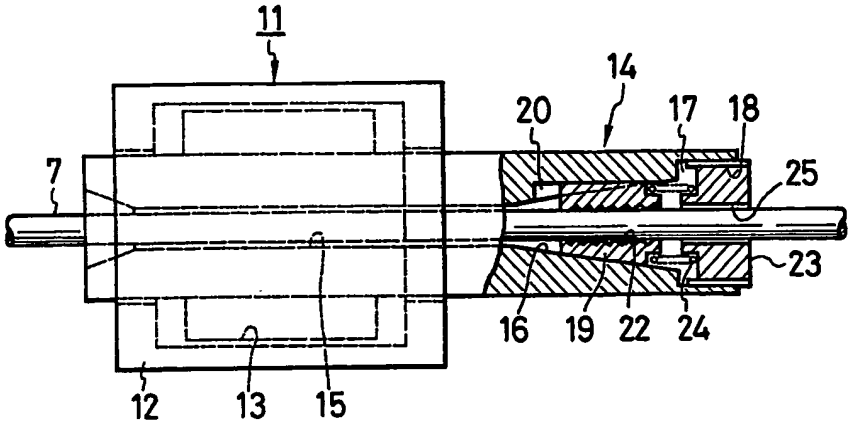

FIG. 2

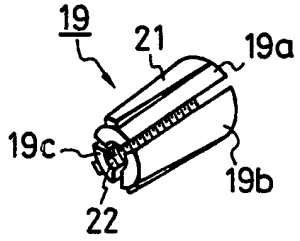

FIG. 3
PRIOR ART

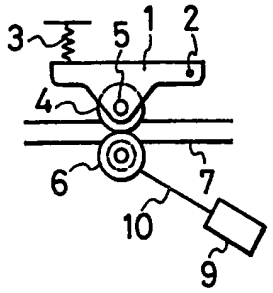

FIG. 4
PRIOR ART

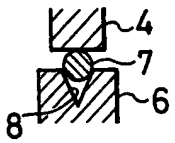

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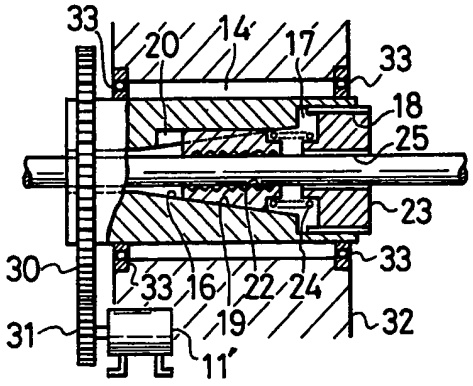
FIG. 5



SPECIFICATION

Welding wire feeder with rotationally driven chuck

Background of the invention

This invention relates to a motor driven welding wire feeder.

Figures 3 and 4 are elevation and end views of a conventional welding wire feeder comprising a swing arm 1 pivotally mounted on a spindle 2 at one end and biased downwardly at an opposite, free end by a compression spring 3. A roller 4 is rotatably mounted on the arm 1 by an axle 5, opposite a drive roller 6 having a circumferential V-shaped groove 8 to accommodate a welding wire 7. A motor 9 drives the roller 6 through a power transmission schematically shown at 10.

In operation the roller 4 presses the welding wire 7 against the groove 8 of the drive roller 6, and the wire is frictionally advanced or fed by the rotation of the roller 6 via the motor 9 and the power transmission 10. With such a conventional construction the welding wire is prone to slip on the drive roller 6, which detracts from the quality of the weld due to the unsteady delivery of the welding wire.

Summary of the invention

This problem is overcome by the welding wire feeder according to the present invention, wherein an axdial hole through which a welding wire passes is provided in the rotor shaft of a motor, and a concial chuck is spring biased into a similarly conical recess in one of the shaft. The chuck segments are keyed to the shaft to rotate therewith, and their threaded inner surfaces bite into the outer circumference of the welding wire to insure the positive and steady feed thereof.

Brief description of the drawings

Figure 1 is a partially sectioned elevation view of a welding wire feeder according to a first embodiment of the present invention;

Figure 2 is a perspective view of the chuck embodied in Figure 1;

Figure 3 is a schematic elevation view of a conventional welding wire feeder;

Figure 4 is an end view thereof, and,

Figure 5 is a partially sectioned elevation view of a welding wire feeder according to a second embodiment of the present invention.

Detailed description of the preferred embodiment

Referring to Figure 1, an electric drive motor 11 comprises a stator 12 and a rotor 13 mounted around a shaft 14. A bore 15 extends axially through the center of the rotor shaft. An outwardly divergent conical recess 16 is formed at one end of the shaft 14, followed by a cylindrical recess 17 whose diameter is larger than the largest diameter of the conical recess. The recess 17 is threaded at 18, and a conical chuck 19 is disposed in the conical recess 16. The chuck 19 comprises three segments 19a, 19b, 19c, for example, as shown in Figure 2. An upstanding guide boss or key 21 on each segment is engaged in a corresponding guide groove or keyway 20 formed in the recess 16. The inner circumferential face of each segment is threaded as at 22. A nut 23 centrally apertured at 25 is screwed into the threaded recess 17, and applies pressure against the chuck 19 through a spring 24. The welding wire 7 extends through the shaft bore 15 and aperture 25 as shown.

In operation, the welding wire is initially inserted through the bore 15, the chuck 19 and the aperture 25 of the nut 23 while the nut is loose. The nut is then tightened using a spanner tool or the like (not shown) to apply pressure to the chuck 19 through the spring 24. Such pressure urges the chuck segments inwardly and contracts the diameter of the chuck until the sharp ridges of the chuck segment threads bite into the outer circumferential surface of the comparatively soft welding wire 7.

If the motor 11 is then energized to turn the rotor shaft 14, the chuck 19 will also rotate due to the engagement of the guide bosses 21 in the grooves 20. The motor 11 is of course fixedly mounted to a welding machine or the like (not shown), and the welding wire 7 is thus advanced or fed axially through the apparatus in accordance with the thread pitch of the chuck and the rotational speed of the motor in a sure and positive manner and without any slippage.

As will be apparent to those skilled in the art, any suitable type of rotational drive device may be used in place of the disclosed electric motor, for example a pneumatic or hydraulic motor.

According to the first embodiment shown in Figures 1 and 2, the motor is formed with central bore through which the welding wire 7 passes. In other words, the motor is axially aligned with the rotor shaft 14. On the other hand, according to a second embodiment shown in Figure 5, a driven gear 30 is fixed to the shaft 14, and a drive gear 31 connected to a drive motor 11' is in meshing engagement with the driven gear 30. In this case, it is unnecessary to form a central bore in the moror 11'. The shaft 14 is rotatably supported to a stationary frame 32 through bearings 33.

CLAIMS

1. A welding wire feeder, comprising:

a) an elongate shaft (14) having a central bore (15) extending axially therethrough,

b) means (12, 13) for rotationally driving the shaft,

c) an outwardly divergent conical recess (16) defined in one end of the shaft, coaxial about the bore,

d) a segmented conical chuck (19) disposed in the recess, inner circumferential surfaces of the chuck segments being helically threaded (22).

e) means (20, 21) for constraining the chuck to rotate with the shaft, and

f) means (23, 24) for controllably biasing the chuck into the recess to close the chuck such that the segment threads bite into the outer circumferential surface of a welding wire (7) inserted through the shaft bore and chuck, whereby the rotation of the shaft positively axially advances the wire in a screw feed manner.

2. A welding wire feeder according to claim 1, wherein the constraining means comprises

upstanding bosses (21) on one of the recess and chuck segments, and guide grooves (20) in another of the recess and chuck segments for slidably receiving the bosses.

3. A welding wire feeder according to claim 1, wherein the biasing means comprises:

a) a threaded cylindrical recess (17) defined in said one end of the shaft, outwardly of the conical recess,

b) a centrally apertured nut (23) engaged in the cylindrical recess, and

c) a compression spring (24) disposed between an outer end of the chuck and an inner end of the nut.

4. A welding wire feeder according to claim 2, wherein the biasing means comprises:

a) a threaded cylindrical recess (17) defined in said one end of the shaft, outwardly of the conical recess,

b) a centrally apertured nut (23) engaged in the cylindrical recess, and

c) a compression spring (24) disposed between an outer end of the chuck and an inner end of the nut.

5. A welding wire feeder according to claim 1, wherein the driving means comprises an electric motor rotor (13) fixed around the shaft, and a stator (12) surrounding the rotor and cooperable therewith.

6. A welding wire feeder according to claim 2, wherein the driving means comprises an electric motor rotor (13) fixed around the shaft, and a stator (12) surrounding the rotor and cooperable therewith.

7. A welding wire feeder according to claim 3, wherein the driving means comprises an electric motor rotor (13) fixed around the shaft, and a stator (12) surrounding the rotor and cooperable therewith.

8. A welding wire feeder according to any one of claims 5 to 7, wherein said shaft extends through said motor.

9. A welding wire feeder according to claim 1, wherein said means for rotationally driving the shaft is positioned beside the shaft.

10. A welding wire feeder according to claim 9, further comprising a drive gear connected to said means for rotationally driving, and a driven gear connected to said shaft, said drive gear being in meshing engagement with said driven gear.

11. A welding wire feeder substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

12. A welding wire feeder substantially as hereinbefore described with reference to Figure 5 of the accompanying drawings.

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